

Unit 8

Day 3

The Quadratic Formula

Consider the standard form of a quadratic:

$ax^2 + bx + c = 0$ complete the square to solve for x

Derive
PROOF

$$ax^2 + bx + c = 0$$

$$\frac{ax^2 + bx}{a} = \frac{-c}{a}$$

$$\frac{-c}{a} + \frac{4a}{4a} + \frac{b^2}{4a^2}$$

$$\frac{-4ac}{4a^2} + \frac{b^2}{4a^2}$$

$$\frac{b^2 - 4ac}{4a^2}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{-c}{a} + \frac{b^2}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$1) \quad 2x^2 + 4x - 7 = 0$$

$$a=2 \quad b=4 \quad c=-7$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-4 \pm \sqrt{16 - 4(2)(-7)}}{2(2)}$$

$$= \frac{-4 \pm \sqrt{16 + 56}}{4}$$

$$= \frac{-4 \pm \sqrt{72}}{4}$$

$$= \frac{-4 \pm 6\sqrt{2}}{4} = \frac{-2 \pm 3\sqrt{2}}{2}$$

$$2) \left(\frac{1}{3}m^2 + \frac{1}{5}m + \frac{1}{15} = 0 \right) \times 15$$

$$5m^2 + 3m + 1 = 0$$

$$a=5 \quad b=3 \quad c=1$$

$$X = \frac{-3 \pm \sqrt{9 - 4(5)(1)}}{10}$$

$$X = \frac{-3 \pm \sqrt{-11}}{10} = \frac{-3}{10} \pm j \frac{\sqrt{11}}{10}$$

$$3) \quad a^2 + a\sqrt{3} + 7 = 0$$

$$a^2 + a\sqrt{3} + 5 = -2$$

$$a=1 \quad b=\sqrt{3} \quad c=7$$

$$X = \frac{-\sqrt{3} \pm \sqrt{(\sqrt{3})^2 - 4(1)(7)}}{2}$$

$$X = \frac{-\sqrt{3} \pm \sqrt{3-28}}{2}$$

$$X = \frac{-\sqrt{3} \pm \sqrt{-25}}{2}$$

$$X = \frac{-\sqrt{3}}{2} \pm \frac{5i}{2}$$

HW pg 118-119 23-34, 39-44 all